

Cell Traffic Trace

The Cell Traffic Trace feature for subscriber and equipment tracing provides detailed information at the call level on one or more UEs and serves as an additional source of information (along with Performance Measurements) for monitoring and optimization operations.

This chapter describes MME support for Cell Traffic Trace.

Important The Cell Traffic Trace feature is intended only for limited debugging and not for wide-scale deployment.

- Feature Summary and Revision History, on page 1
- Feature Description, on page 2
- How It Works, on page 3
- Configuring Cell Traffic Trace, on page 7
- Monitoring and Troubleshooting the Cell Traffic Trace, on page 12

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	MME
Applicable Platform(s)	• ASR 5500 • VPC-DI • VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	• *Command Line Interface Reference* • *MME Administration Guide* • *Statistics and Counters Reference*

Revision History

Revision Details	Release
The Cell Traffic Trace feature enables eNodeB to support real time cell traffic tracing in this release.	21.6
First introduced.	Pre 21.2

Feature Description

The Cell Traffic Trace feature, for subscriber and equipment tracing, provides detailed information at the call-level on one or more UEs and serves as an additional source of information (along with Performance Measurements) for monitoring and optimizing operations.

Important This feature is intended only for limited debugging and not for wide-scale deployment.

The Cell Traffic Trace feature provides a 3GPP standard-based cell trace function for tracing all calls in a single cell or multiple cells. Cell Tracing provides the capability to log on to data on any interface at a call level for a specific user or mobile type or a service initiated by a user. In addition, Cell Tracing provides instantaneous values for a specific event.

Trace activation/deactivation is administered by an entity called an Element Manager (EM) on the Network Elements (NE) that comprise the network. The NE generate the trace data or results and transfers the information to a Trace Collection entity (TCE). Trace activation/deactivation can be of two types:

- Management Activation/Deactivation - Trace activated/deactivated in different NEs directly by using the management EM.
- Signaling based Activation/Deactivation - Trace activated/deactivated in different NEs using signaling interfaces between them. The NEs forward the activation/deactivation originating from EM.

In an EPS network, trace is enabled on the following NE: eNodeB, MME, SGW, PGW, HSS, EIR and so on. Cell Traffic Trace enables tracing of all active at one or more Cells in eNodeBs.

A valid license key is required to enable Cell Traffic Trace. Contact your Cisco Account or Support representative for information on how to obtain a license.

Real Time Cell Traffic Tracing

The Cell Traffic Trace feature is enhanced to support real time cell traffic tracing.

MME will generate XML files for cell tracing of UEs at a rate equivalent to the CEPS (Call Events Per Second) supported on MME. MME will push out XML files to the configured Trace Collection Entity (TCE) so that cell tracing can be enabled on eNodeB and the correlation data from MME is received at TCE in real time.

Real time cell traffic tracing enhancement requires a valid feature license. Enabling and disabling real time cell traffic trace is CLI controlled.

For more information, refer to the Architecture , on page 3 and Configuring Cell Traffic Trace, on page 7 sections in this chapter.

How It Works

When Cell Traffic Trace is activated in the monitored cell(s) of E-UTRAN, the eNodeB starts a Trace Recording Session for new calls/session and also for existing active calls/session. A Trace Recording Session Reference (TRSR) is allocated by eNodeB for each of the monitored call/session. The TRSR includes the TRSR reference along with the Trace Reference and TCE address in the CELL TRAFFIC TRACE message to the MME over S1 connection.

Cell Traffic Trace Procedures are used at the MME to assist the TCE Server in correlating the Trace Reference (generated by EM) and Trace Recording Session Reference (generated by the eNodeB) with the IMSI, IMEI (SV) corresponding to the traced session as the eNodeBs only have access to temporary UE identities and not permanent identities (IMSI, IMEI (SV)).

Cell Traffic Trace involves the following nodes:

- Network Element (NE): Network elements are the functional component to facilitate subscriber session trace in mobile network. The term network element refers to a functional component that has standard interfaces in and out of it. It is typically shown as a stand-alone AGW. Examples of NEs are the MME, S-GW, and P-GW.
- Element Manager (EM): The Element Manager (EM) forwards the globally unique Trace Reference to each eNodeB.
- eNodeB
- MME and
- Trace Collection Entity (TCE) server

The Cell Traffic Trace feature operates sequentially and is classified into two stages:

- Trace Files management - Creation of Trace files, renaming and moving trace files to respective directories, compression and archiving of trace files. The configuration for this process is discussed in the Configuring Cell Traffic Trace section.
- Decompression - This process is executed to extract compressed and archived files. The files are named by a **.gz** extension. It is highly recommended to use tar for the decompression process. The command syntax to decompress the trace files is as follows: **Syntax: tar -zxf <file_name>.gz**

Note Compression or decompression of files is not supported for real time cell tracing as these operations take more time and real time performance will not be achieved.

Architecture

This section describes the architecture for both legacy cell traffic tracing and real time cell traffic tracing.

Cell Traffic Tracing

MME supports the following in Cell Traffic Trace:

- When MME receives a Cell Traffic Trace message from eNodeB, it extracts the Trace Reference and Trace Recording Session Reference, and checks for the IMSI and IMEI if present, from the S1 AP ID.
- The MME send the IMSI, IMEI if present, and the Trace References received in a Cell Traffic Trace to the TCE. The TCE address is received in the Cell Traffic Trace signal from eNodeB.
- The MME complies with data formats of Trace Reference, Trace recording Session Reference and TCE Address.

The Cell Traffic Trace operation takes place in the following stages:

Stage 1: Creation of trace files on expiry of Collection Timer

- A list is initialized at the session manager to store relevant information of all the incoming cell trace messages.
- Once the collection timer expires, the session manager gathers all the cell traces into a file, which has a temporary name, and writes it to the hard-disk.

Stage 2: Renaming and moving the files to archive directories by session trace

- The session trace renames these temporary filenames to C Type filenames. The C Type file name is a modified version of the 3gpp specification. A suffix is added to every C type file. Thus starting from 1 the suffix ends at 4294967295. After reaching the maximum limit, then the suffix restarts from 1. The files are then moved to the directories.

  For example, refer to the file name given below:

  ```
  C20150520.0137-0400-MME.RTPBNGASR5KCH78.21436500008D-1C20150529.0231-0400-MME.RTPBNGASR5KCH78.3143650000FF-4294967295
  ```

  The C Type file format is modified to provide additional trace information with a trace extension, which has three additional fields such as eNodeB ID, UE S1 AP identity and the MME UE S1 AP identity.
- A new archive directory is created by the session trace when the previous directory is full. The syntax for the new directory is as follows: Syntax: <nodename>.<time-stamp in seconds>.<tce_index>.<file-counter>. For example:

  ```
  RTPBNGASR5KCH78.555ac613.1.1
  ```

- If the cell trace messages are meant to be for two different TCE's, then a second directory would be created and the files are moved to their directories respectively.

Stage 3: Compression and Archiving files to directories by session trace

- Session trace waits for a configured file count or timer expiry or directory size to be reached before archiving the directories.
- Once the archive directories are full, the session trace archives or compresses these directories and moves them to the final directories.

The above mentioned files and are monitored and processed to their final directories based on the following timers:

- **Collection timer:** This timer is configurable, and the timer ranges from 0 - 255 seconds. The collection timer is triggered by the session manager. Once the timer expires, the session manager writes the files to the staging location in the hard disk. After all files are written, a messenger call is sent from session manager to session trace indicating the details of the new file.

- **Archive trigger timer:** This timer is configurable, and the timer ranges from 1 to 3600 seconds. The Archive timer is triggered by the session trace. This timer is a safety mechanism to make sure archive directories are closed and sent for compression and archiving.

Real Time Cell Traffic Tracing

The Cell Traffic Trace feature is enhanced to support real time cell traffic tracing.

MME will generate XML files for cell tracing of UEs at a rate equivalent to the CEPS (Call Events Per Second) supported on MME. MME will push out XML files to the configured Trace Collection Entity (TCE) so that cell tracing can be enabled on eNodeB and the correlation data from MME is received at TCE in real time.

- MME-APP sends cell trace records to the CDRMOD proclet to queue the records. When the queue size reaches a limit or when a timer expires, the CDRMOD instance writes all records to an XML file.
- CDRMOD writes the real time trace records to the RAM disk on PSC.
- The HDCTRL task moves the realtime trace record files from RAM disk to Hard Disk.
- The cell trace record files can be pushed only from Hard Disk to an external server.

Record Buffering and File Generation

The generation of cell traffic trace records are supported in both single-mode and multi-mode. It is recommended to run the Call Detail Records Module (CDRMOD) in multi-mode for enhanced performance in comparison to existing cell trace using SESSTRC.

The CDRMOD supports two modes of execution — single-mode and multi-mode. By default, CDRMOD runs in single-mode.

- Single Mode: In this mode, only one instance of CDRMOD will be running for the entire chassis. All the sessmgr instances that are running on a PSC will send the records to the CDRMOD instance.
- Multi Mode: In this mode, there will be one instance of CDRMOD per PSC card. All the sessmgr instances that are running on a PSC will send the records to the CDRMOD instance running on that card. This will enhance the file transfer performance as the CDRMOD instances running on each card are sending files to an external server in parallel.

The existing CDRMOD functionality is extended to handle cell traffic trace records. CDRMOD functionality for cell trace module is as follows:

- Cell trace records received from MME are stored in the list
- XML file is generated from the records stored in the list when one of the following trigger is hit:
  - Expiry of file rotation time
  - Buffer list is reached to the configured file rotation num records

Currently only one skip list is used to store the records received from all eNodeBs. Archiving and compression of file is not supported.

File Name Format: The C type file name is a modified version of the 3GPP specification. The below suffix is added to every C type file.

1. CDRMOD instance ID (first 3 digits)

2. Unsigned integer number starting from 1 to 4294967295. After reaching the maximum limit, the suffix restarts from 1 (last digit).

For example: C20150520.0137-0400-MME.RTPBNGASR5KCH78.21436500008D-0011

C20150529.0231-0400-MME.RTPBNGASR5KCH78.3143650000FF-0014294967295

Trace file extensions: To keep parity with the existing cell trace feature, the **trace cell-traffic trace-extension enb-id ue-s1ap-id** option is configured to enable the trace file extension.

Record Transfer

Cell trace records files are stored in local hard-disks and transferred via SFTP to an external server periodically using the PULL or PUSH model.

The CDRMOD supports two modes of record transfer:

- PULL: This model will not be used for cell trace records.
- PUSH: Cell trace files will be pushed to the configured external server periodically.

Record Storage

The cell trace files are initially generated in RAMFS on the PSC card. If the hard disk is configured with **cell-trace use-hard-disk** command, the files will be moved to hard disk on the SMC card. The HDCTRL proclet is responsible for transferring completed cell trace files from the RAMFS of PSC to the SMC hard disk. For the transfer, CDRMOD registers with HDCTRL when **cell-trace use hard-disk** configuration is enabled.

Limitations and Restrictions

The limitations and restrictions with this enhancement include:

- Generation of realtime trace records are supported in both single-Mode and multi-Mode. It is recommended to use multi-mode.
- Chassis reboot is required to run CDRMOD in multi-mode.
- If one module is configured in a context, then other modules must also be configured in the same context.
- If the "use-harddisk" and "remove-file-after-transfer" options are configured for one module, it will be applicable for all the modules.

Limitations

Decompression of the trace files using gzip or gunzip may cause file corruption depending on the system platform used, for example: Linux. Mac and so on

Standards Compliance

The Cell Traffic Trace feature complies with the following standards:

- 3GPP TS 36.413 Release 10, S1 Application Protocol (S1AP)
- 3GPP TS 32.422 Release 10, Trace control and configuration management
- 3GPP TS 32.423 Release 10, Trace data definition and management

Configuring Cell Traffic Trace

This section documents configuration of Cell Traffic Trace and its related functionality.

Configuring Trace Files Storage

The configuration provided in the below section is used to store the cell traffic trace files locally or on a TCE server.

The commands illustrated below configure the Cell Traffic Trace. In support of the Cell Trace feature, the **enb** keyword has been added, which monitors the traffic from the eNodeB network element. The configuration also includes archiving and compression parameters to archive and compress trace files into their directories.

Local Storage

To store the trace files locally, use the following configuration:

```
configure
   session trace network-element enb tce-mode none collection-timer
timer_value
   [ no ] session trace network-element enb
   end
```

Notes:

All parameters are new to the Cell Traffic Trace feature. For information on these parameters refer to the **session trace** command in the *Command Line Interface Reference*.

TCE Server Storage

To store the trace file on a TCE server, use the following configuration:

```
configure
   session trace network-element enb tce-mode push transport sftp path
server_path_name username user_name [ encrypted ] password user_password
collection-timer timer_value
   [ no ] session trace network-element enb
   end
```

Notes:

All parameters are new to the Cell Traffic Trace feature. For information on these parameters refer to the **session trace** command in the *Command Line Interface Reference*.

Configuring Cell Traffic Trace Template - Archiving and Compressing Trace Files

The configuration provided in this section is used to archive and compress trace files into their directories.

This command creates a template with parameters that configure archiving and/or compression for the files generated by Cell Traffic Trace. Defining this template and archiving and/or compression of files is optional when setting up Cell Traffic Trace. The **enb** keyword processes Cell Traffic Trace in the MME.

```
configure
  template-session-trace network-element enb template-name cell-trace
    [ no ] disk-limit  disk_size
    [ no ] archive files number_of_files size size timer timer_value

    [ no ] trace-extension enb-id ue-s1ap-id
    end
```

Notes:

- **cell-trace** indicates the template name 'cell-trace' for storage of the eNodeB cell trace storage parameters. Note that you cannot define a template name - there is only one template and its name is 'cell-trace'.
- **disk-limit** *disk_size* is measured in megabytes (MB). This keyword defines the total space to be reserved on the hard disk. If disk-limit alone is configured then compression is not considered. The disk-limit size ranges from 1 MB to 20480 MB. If disk-limit is not configured, a default size of 200 MB is allocated in the hard disk for storing Cell Trace files.
- **archive** allows you to define the archive directory and the archive parameters.
  - **files** *number_of_files* defines the maximum number of files that can be archived in the directory. When the limit is reached, the archive closes. The range is an integer from 1 to 10000.
  - **size** *size* defines the directory limit in MB. The range is an integer from 1 to 10
  - **timer** *timer_value* defines the total time in seconds before the pending directories are archived. The range is an integer from 1 through 3600.
- The **trace-extension** keyword defines the UE or eNodeB identity extension parameters for the C Type files.
  - The **enb-id** keyword is an additional field in the C Type file that identifies the global eNodeB entry.
  - The **ue-s1ap-id** keyword is an additional field in the C Type file that identifies the eNodeB ID, UE S1 AP identity and the MME UE S1 AP identity.

Enabling Cell Traffic Tracing

Use the following configuration to enable realtime cell traffic tracing for eNodeBs in MME service.

The **trace cell-traffic** CLI command is license controlled and uses the legacy Session Trace license.

```
configure
  context context_name
    mme-service service_name
      trace cell-traffic [ trace-extension enb-id ue-s1ap-id ]
      no trace cell-traffic
      end
```

Notes:

- **trace**: Specifies the trace configuration for MME.
- **cell-traffic**: Specifies the configuration for eNodeB cell traffic tracing.
- **trace-extension**: Defines the UE or eNodeB identity extension parameters.
- **enb-id**: Specifies the Global eNodeB Identity.
- **ue-s1ap-id**: Specifies the eNodeB UE S1AP Identity and MME UE S1AP Identity.

- **no**: Disables real time cell tracing for eNodeBs.

Configuring Cell Trace Module

Use the following configuration to create, configure, or delete the Cell Trace module for real time cell traffic tracing in a context.

The user must be in a non-local context when specifying the **cell-trace-module** command.

```
configure
   context context_name
      [ no ] cell-trace-module
         cell-trace { purge { { storage-limit storage_limit  | time-limit
time_limit  } [ max-files max_files ] } | push-interval interval | push-trigger
 { space-usage-percent usage_precent } | remove-file-after-transfer |
transfer-mode { pull [ module-only ] | push primary { encrypted-url enc_url
 | url url [ module-only ] } | use-harddisk }
         file [ delete-timeout seconds | directory directory_name |
field-separator [ hyphen | omit | underscore ] | rotation { num-records
num_records | time rotation_time } | storage-limit storage_limit |
trap-on-file-delete }
         default { cell-trace [ purge | push-interval | push-trigger |
remove-file-after-transfer | transfer-mode | use-harddisk ] | file [
delete-timeout | directory | field-separator | rotation { num-records |
time } | storage-limit | trap-on-file-delete ] }
         end
```

Notes:

- **cell-trace-module**: Creates the module for real time cell traffic tracing.

  Once the realtime trace module is configured, the real time trace file transfer parameters can be configured.

  Entering the **cell-trace-module** command results in the following prompt and changes to the Cell Trace Module Configuration mode:

  [*context_name*]*host_name*(config-cell-trace)#

- **no**: Removes the real time trace module configuration for the current context.

- **cell-trace { purge { { storage-limit***storage_limit* | **time-limit** *time_limit* **} [max-files** *max_files* **] }**: Specifies to purge or delete the cell trace records based on "time" or "volume" to restrict hard-disk space usage for cell trace records.

  storage-limit *storage_limit*: Specifies the storage space for the record files, in megabytes. *storage_limit* must be an integer from 10 to 143360.

  time-limit *time_limit*: Specifies the time to delete record files, in seconds. *time_limit* must be an integer from 600 to 2592000.

  max-files *max_files*: Specifies the maximum number of records to purge per iteration. *max_files* must be an integer 0 or ranging from 1000 to 10000. When value is set to 0, it deletes all records until purge limit is reached.

  By default, no purge operation is performed by the VPNMGR module.

- **cell-trace push-interval** *interval*: Specifies the transfer interval in seconds to push cell traffic trace files to an external file server. *interval* must be an integer from 1 to 30.

  Default: 1 second

- **cell-trace push-trigger { space-usage-percent** *usage_precent* **}**: Configures the disk utilization trigger for cell traffic trace files.

  space-usage-percent *usage_precent*: Specifies the disk utilization percentage for triggering PUSH. *usage_precent* must be an integer from 10 to 80.

- **cell-trace remove-file-after-transfer**: Deletes the files from RAMFS after transfer to an external server. If the **cell-trace use-harddisk** command is not configured, it is recommended to use this command.

- **cell-trace transfer-mode { pull [module-only] | push primary { encrypted-url** *enc_url* **| url** *url* **} [module-only] }**: Configures the transfer mode for cell trace record files. Only one TCE address configuration is required and all files will be sent to this address irrespective of the TCE address received from eNodeB in S1AP cell tracing message. Both the addresses must be the same mostly.

  pull [module-only]: Specifies that L-ESS pulls the cell trace files.

  push primary { encrypted-url *enc_url* **| url** *url* **} [module-only]**: Specifies that ST pushes the cell trace files onto the configured L-ESS server. *enc_url* specifies the location where the cell trace files will be transferred and must be entered in encrypted format. *url* specifies the location where the cell trace files will be transferred and must be entered in the server URL format *scheme://user:password@host:[port]/directory* - string of size 1 to 1024.

  If the **module-only** keyword is set, then the given configuration is applied only for the specific record type. The administrator can configure record transfer information for all record types separately or combined using the **module-only** keyword.

- **cell-trace use-harddisk**: Moves the cell trace files from RAMFS to */hd-raid/* and then transferred to an external server. It is recommended to use this command to prevent space on RAMFS becoming full.

- If multiple modules are configured, then the **cell-trace use-harddisk** option must be configured in only one of the modules. All other modules (which do not have the **use-harddisk** option configured) will use the hard disk by default. The other modules will also inherit the PUSH parameters of the module with **use-harddisk** option configured. If these modules need different PUSH parameters like url and push-interval as compared to the module with **use-harddisk** option, then the **module-only** keyword must be configured.

  For cell-trace-module, the minimum value of push-interval is 1 second. For all other modules, the minimum value of push-interval is 30 seconds. Hence, to avoid undesired behavior:

  - If **use-harddisk** is configured for cell-trace-module, then **module-only** option must be configured while configuring the file transfer URL for all other modules.

    For example:

```
configure
   context context_name
      cell-trace-module
         cell-trace use-harddisk
         cell-trace transfer-mode push primary url
sftp://user:password@host:[port]/directory
         cell-trace push-interval 1
         end
```

```
configure
   context context_name
      udr-module active-charging-service
         cdr transfer-mode push primary url
sftp://user:password@host:[port]/directory module-only
         cdr push-interval 30
         end
```

The above configuration will ensure that push-interval = 1 second is not inherited from cell-trace-module and the correct push-interval = 30 seconds is used for udr-module.

- If **use-harddisk** option is configured for any other module except cell-trace-module, then **module-only** option must be configured while configuring the file transfer URL for cell-trace-module.

  For example:

```
configure
   context context_name
      udr-module active-charging-service
         cdr use-harddisk
         cdr transfer-mode push primary url
sftp://user:password@host:[port]/directory
         cdr push-interval 30
         end
```

```
configure
   context context_name
      cell-trace-module
         cell-trace use-harddisk
         cell-trace transfer-mode push primary url
sftp://user:password@host:[port]/directory module-only
         cell-trace push-interval 1
         end
```

  The above configuration will ensure that push-interval = 30 sec is not inherited from udr-module and the correct push-interval = 1 sec is used for cell-trace-module.

- **file delete-timeout** *seconds*: Configures the time to delete the completed cell traffic trace files after specified number of seconds. *seconds* must be an integer from 3600 through 31536000.
- **file directory** *directory_name*: Specifies a subdirectory to be generated in the default directory */records/celltrace* in which to store EDR files. *directory_name* must be an alphanumeric string of 1 through 191 characters.
- **file field-separator { hyphen | omit | underscore }**: Specifies the field inclusion/exclusion type of separators between two fields of cell trace files.
  - **hyphen**: Specifies to use "-" (hyphen) as the field separator between file format fields.
  - **omit**: Excludes the field separator.
  - **underscore**: Specifies to use "_" (underscore) as the field separator between file format fields.
- **file rotation { num-records** *num_records* **| time** *rotation_time* **}**: Specifies the criteria to rotate the record file. CDRMOD will hold the cell trace records in buffer and write them to the XML file only when the criteria configured by this command are met.

num-records *num_records*: Completes the file when the specified number of records are added. When the number of records in the buffer reaches the specified value, records will be written to the XML file. *num_records* must be an integer from 100 to 2000. Default: 1000.

time *rotation_time*: Completes the file based on file duration, time after which records will be written to XML file. *num_records* must be an integer from 1 to 30. Default: 1 second.

- **file storage-limit** *storage_limit*: Configures the total available storage space on RAMFS for cell trace files. *storage_limit* must be an integer from 10485760 to 134217728. When the storage space is full, the oldest files on RAMFS will be deleted first to create space for new files.
- **file trap-on-file-delete**: Instructs the system to send an SNMP notification (starCDRFileRemoved) when a cell trace file is deleted due to lack of space.
- **default**: Configures the default value(s) for the cell trace paramters.

Verifying the Cell Traffic Trace Configuration

The following command is used to display/verify the parameters for Cell Traffic Trace from the eNodeB network element.

show session trace template network-element enb template-name cell-trace

On running the above mentioned show command the following statistics are displayed:

```
Template name: cell-trace
NE Type: ENB
Cell Trace file Extension entries: GLOBAL-ENB-ID ENB-UE-S1AP-ID MME-UE-S1AP-ID
Storage Parameters for Archiving Cell trace files:
Disk Storage Limit: 200 MB
Files per Archive Directory: 4000
Total size per Archive directory: 3 MB
Archive directory timeout: 300 seconds
```

Monitoring and Troubleshooting the Cell Traffic Trace

The following section describes commands available to monitor Cell Traffic Trace on the MME.

Cell Traffic Trace Show Command(s) and/or Outputs

show cell-trace-module file-space-usage

The following new fields are added to the output of this command to display the file space usage information for the cell trace module.

These statistics are also available as part of the **show cdr file-space-usage** command output.

- CDRMOD Instance Id — Displays the CDRMOD instance identifier.
- Cell-Trace File Storage Limit — Displays the configured storage limit for cell trace files, in bytes.
- Cell-Trace File Storage Usage — Displays the storage space utilized for cell trace files, in bytes.
- Percentage of Cell-Trace file store usage — Displays the percentage of storage space utilized for cell trace files.

show cell-trace-module statistics

The following new fields are added to the output of this command to display the cell trace module counters and statistics.

These statistics are also available as part of the **show cdr statistics** command output.

- CDRMOD Instance Id — Displays the CDRMOD instance identifier.
- Cell-Trace Specific Statistics:
  - Cell-Trace-module files rotated — Displays the total number of cell trace files rotated.
  - Cell-Trace-module files rotated due to time limit — Displays the number of cell trace files rotated due to time limit (when "file rotation num-records <num_records>" condition is hit).
  - Cell-Trace-module files rotated due to records limit — Displays the number of cell trace files rotated due to records limit (when "file rotation time <rotation_time>" condition is hit).
  - Cell-Trace-module file rotation failures — Displays the total number of times rotation failed for cell trace files.
  - Cell-Trace-module files deleted — Displays the number of cell trace files deleted.
  - Cell-Trace-module records deleted — Displays the number of cell trace records deleted.
  - Cell-Trace-module records received — Displays the number of cell trace records received.
  - Time of last Cell-Trace-module file deletion — Displays the date and time of last cell trace file deleted.
- Cell-Trace-module PUSH Statistics:
  - Successful File Transfers — Displays the number of succesful file transfers.
  - Failed File Transfers — Displays the number of failed file transfers.
  - Num of times PUSH initiated — Total number of times a cell trace PUSH attempt was initiated.
  - Num of times PUSH Failed — Total number of times a cell trace PUSH attempt failed.
  - Num of times PUSH cancelled due to HD failure — Total number of times cell trace PUSH operation was cancelled due to hard disk failures.
  - Num of periodic PUSH — Displays the number of periodic PUSH operations.
  - Num of manual PUSH — Displays the number of manual PUSH operations.
  - Current status of PUSH — Displays the current status of the PUSH operation – Running/Not Running.
  - Last completed PUSH time — Displays the date and time of the last PUSH operation completed.

show mme-service name <mme_svc_name>

The following new fields are added to the output of this command:

- Cell Tracing — Indicates whether realtime cell tracing is enabled or disabled.

- Trace Extension — Indicates whether cell trace extension is enabled or disabled.

show session trace statistics

On running the above mentioned show command, statistics similar to the following are displayed:

```
Interface not traced: 0
Total number of file generated: 25541
Number of Cell Traffic Trace files generated: 25541
Total archive files: 7
Avg Time in secs, for archiving one directory: 2.247592
Avg Time in secs, for Moving one C type file: 0.0200471
Avg files per archive directory: 3648
Frequency of Archiving Triggers:
          Files: 5
          Size: 1
          Time-out: 1
```